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ABSTRACT

Two related studies of the relationship between non-English language background (NELB) and the academic achievement of high school seniors are reported. The first is a kindergarten reading follow-up study (n=3,959) examining the long-term effects on high school seniors of learning to read or not learning to read in kindergarten. Results of this study indicate clear and consistent support for reading instruction in kindergarten. The second study, the analysis reported here, investigated whether (1) these results would generalize to NELB students (n=496) within this population, and (2) NELB background is a necessary impediment to overall school achievement. Results of this study suggest that NELB students are not generally at a disadvantage in standard educational measures taken in high school after controlling for social class and family size. The positive effects of early reading instruction also generalize to NELB students. It is suggested that these findings challenge common assumptions about disadvantagement among bilingual children. Data from the study are appended. Contains 40 references. (MSE)

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Confronting Unalterable Veriables: Non-English Language Background Students and Schooling Achievement[1]

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Abstract

This paper describes two related studies that examine the relationship between non-English language background (NELB) and the schooling achievement of high school seniors. Both of these studies challenge the current thinking that the unalterable variable of a non-English language background is generally synonymous with being academically disadvantaged. In particular, when NELB students are provided with kindergarten reading instruction in English, they are not found to be disadvantaged in terms of standard educational achievement measured when they are seniors in high school.

Confronting Unalterable Veriables: Non-English Language Background Students and Schooling Achievement

The environmental studies of Bloom (1964) and Hunt (1961) examined educational environmental process variables in relationship to intelligence and school achievement. These "alterable variables" provided an alternative explanation to the findings of the early schooling effects studies that found school achievement to be due to variables generally considered "unalterable," such as social class and ethnic background (e.g., Coleman, 1966). By analyzing alterable variables in relationship to achievement, it was found that the specific kinds of educational experiences that parents and teachers provide for children, particularly in early childhood, make a significant, enduring difference in their school achievement (Majoribanks, 1979; Bloom, 1984; Bennett, 1986; Hanson, 1972; Siegel 1990).

Bloom described alterable variables as those processes and experiences that are under the direct control of parents and educators (1984), such as the

various kinds and quality of educational experiences children receive. Through the measurement of these alterable variables, researchers can identify models of student achievement and predict academic success or failure (e.g., Siegel, 1990).

However, variables considered to be "unalterable," such as ethnic, racial, social class, and non-English language background are also highly related to, and predictive of, school achievement. Students from low social class, minority, and Non-English language backgrounds consistently score lower in measures of school achievement than those from other kinds of backgrounds. Because of this fact, many educators automatically classify students from such backgrounds as academically disadvantaged.

One important group of such children are those from NELB families. Currently there is little agreement about the factors impacting the school achievement of NELB children. While some research has suggested that NELB children have an academic advantage over those from English language backgrounds (e.g., Goldsmat, 1983; Cummins, 1982), others have contended

that such children are at a disadvantage (Crawford, 1989; Youth Policy, 1983).

What is in agreement from the research to date is that a disproportionate percentage of NELB children have difficulty in school (e.g., poor grades, high drop-out rates, low levels of English literacy) (Cummins, 1989). As with other children experiencing difficulties in school, these problems often appear at the beginning of their formal school experiences, usually in kindergarten, and increase over time. In many instances, the achievement status of NELB children is unclear due to the differences in English language competence.

However, in spite of language differences, some NELB children are able to achieve at average and even superior levels (i.e., the early pattern of difficulty in school never materializes). Although the research accumulated over the past several decades has consistently confirmed that literacy development and school achievement are linked to children's early educational experiences (e.g., Durkin, 1966; Hanson and Farrell, 1995; Siegel, 1990; Siegel and Hanson, 1992),

they have not specifically examined the educational experiences of children from non-English language backgrounds(NELB). Thus, it would seem that a logical method for determining possible reasons for the varying levels of academic success for NELB children, would be to examine their early, as well as other educational and language experiences (i.e., alterable variables).

This paper presents the results of two related studies which examined the relationship of school achievement to the unalterable variables of ethnic, SES, and non-English language background. The primary "alterable" variable considered was the provision for examining kindergarten reading instruction in English. The results of both of these studies challenge the current thinking about when students should begin receiving formal reading instruction and that being from a non-English language background (NELB) is generally synonymous with being academically disadvantaged.

The Kindergarten Reading Follow-up (KRF) Study, conducted earlier, is described first in this paper since it provided the data source for the two NELB

inquiries. The KRF Study (N=3,959) was a national follow-up study of a kindergarten beginning reading program was carried out with a grant from the United States Department of Education. The purpose of this study was to examine the long-term effects on high school seniors of learning to read in kindergarten (Hanson and Siegel, 1988a). Accordingly, data were obtained on those high school seniors who had received formal beginning reading instruction in kindergarten, as well as on others who had comparable educational experiences but had not been taught to read until first grade (Hanson and Farrell, 1995).

Results showed clear and consistent support for teaching reading in kindergarten. Participation in a systematically developed and carefully implemented kindergarten reading program was related, not only to higher reading skills, but to higher performance on all indicators of reading competency. Further, students from schools completing more of the Program were better readers as high school seniors as compared to those completing only a portion of the Program.

In comparing the kindergarten reading students to other students in their same district who did not receive any kindergarten reading instruction, the results were even more conclusive. Learning to read in kindergarten was not only related to higher reading skills, but it reduced the need for remediation at both the elementary and high school levels. Students receiving the kindergarten reading instruction fared better in all ways than those who did not receive the instruction. Moreover, these results were consistent across districts, and by racial/ethnic, gender, and socioeconomic groups. In all comparisons, the kindergarten reading students clearly emerged as better off than those who did not receive the instruction.

These impressive findings raised the same and other research questions regarding NELB students (N=496)within this same sample population. The two studies discussed in this paper specifically sought to addressed the research questions: 1) Would the results of the KRF Study generalize to students from non-English language backgrounds? and, 2) is a non-English

background necessarily an impediment to overall school achievement?

Part I: The Kindergarten Reading Follow-up (KRF) Study

Background

During the 1960's and early 1970's the federal government supported an educational R&D project (at the Southwest Regional Laboratory (SWRL)). The purpose of the project was to develop and implement in our nation's schools a beginning reading program that could teach all children to read in kindergarten (Hanson and Schutz, 1975). The major educational product that emerged from this effort was the Beginning Reading Program (hereafter referred to as the BRP or the Program). The BRP was a systematically developed program specifically designed for the purpose of teaching beginning reading skills to children in kindergarten.

The BRP was widely disseminated during the early 1970's using Title III monies. Elementary schools representing about 15% of the nation's kindergarten

pupils adopted it in both the 1972-73 and 1973-74 school years. During the 1973-74 school year, over 2000 elementary schools in 400 school districts across the United States implemented this Program in their kindergarten classes for the purpose of teaching their students to read. These included both public and private school systems, most of which served large numbers of disadvantaged students (Hanson and Schutz, 1975; 1976). The BRP was extremely well received and, even though Title III funding ended in 1974, many districts continued to use the program and the accompanying testing and information system for many years afterwards (Hanson, Lehman, and Bailey, 1981).

A series of reports documented the reading skills acquired by the children who used the BRP. These reports clearly indicated that the children's reading ability was directly linked to Program implementation practices employed by teachers and schools. That is, factors such as the date instruction began and the amount of time the teacher spent each week using the Program predicted the number of units completed by the students (Hanson and Schutz, 1975; 1976; 1978; Hanson

and Bailey, 1983). Thus, although there were wide differences in the number of BRP units completed within each classroom, both within and across districts, the data clearly showed that these differences were due to decisions made by school personnel regarding the time and effort devoted to teaching the Program rather than to either the biosocial (e.g., ethnic background, gender, SES) or behavioral (e.g., entering language skills) characteristics of the kindergarten students and the classes. For example, about 25 weeks were required, on average, to complete all 10 units of the BRP. However, while some schools and teacher used it for the full 25 weeks and completed the entire ten units, others opted to spend fewer weeks providing such instruction. Thus, although all of the children who participated in the Program acquired some reading skills, the differences in the instructional time spent led to differences in the number of BRP units completed by students at the class and school levels. This, in turn, resulted in substantial differences between classes and schools in the reading abilities of their

students at the end of their kindergarten year (see Hanson and schutz, 1978).

Because the progress made by each class, school and district that participated in the BRP was carefully documented in a series of national evaluation studies (e.g., Hanson and Schutz, 1978), a large, descriptive database was compiled. The accessibility of this extensive database made it possible to conduct a detailed follow-up study a number of years later. During the 1985-86 school year, data were gathered from 3,959 high school seniors who were attending high schools in twenty-four school districts across the country; twenty-three of these districts had implemented the kindergarten BRP in some or all of their elementary schools during the 1973-74 school year. Thus, follow-up data were obtained from the high school seniors in twenty-three school districts who had participated in the kindergarten BRP, as well as from other seniors in the same high schools who had similar schooling experiences, but had not received BRP reading instruction.

KRF Study Design

Developing the procedures required to carry out the KRF Study appeared to be quite simple at one level. All that was needed was to obtain date on the reading skills, habits, and attitudes of high school seniors from a sample of the districts and schools that had implemented the BRP in kindergarten 12 years earlier and compare them to other high school seniors from the same districts who had not received the kindergarten BRP instruction. Dismissing the logistical complexities associated with such a strategy, this left open the critical question of how to make meaningful comparisons. Specifically, how might comparison groups be formed to assess the effects of kindergarten reading skills, attitudes, and other characteristics of these high school seniors? To address this issue, an evaluation research strategy was defined in which factors using characteristics of the program, participants, and settings were used to form adhoc and post hoc comparison groups (See Hanson, 1986).

A central issue in this type of evaluation research is to identify naturally occurring program

implementation differences and use them as the basis for forming comparison groups. Using such comparison groups, logically related effects variables could be analyzed for differences. Any finding could then be replicated (1) across specific student subpopulations of interest, (2) different settings (classes, schools, and districts), and (3) across logically related dependent variables. In essence, the credibility of this type of research depends on both the replicability and the generalizability of the results produced by this cross validation process within study subpopulations.

These subpopulations are defined in several ways (i.e., gender, ethnic, and social class) and across settings such as classes, schools, and districts. An even more ideal arrangement is to replicate the results across successive inquiries such as across several years or cohorts of students (see Hanson, 1986 and Hanson, Lehman and Bailey, 1981). In this way, the research strategy embodies elements of operations research (typically used to provide management information) in combination with more traditional

evaluation methods (typically used to evaluate policy alternatives). At the same time, the inquiries employ instruments designed to be function specific and, therefore, sensitive to any differences that might be present (Bloom, 1967; Hanson, McMorris, and Bailey, 1986; Hanson and Siegel, 1988a).

Another issue in using this analytic strategy in the KRF Study was the definition of the characteristics of students that might be affected by learning to read. Defining the potential effects variables was a major focus of the assessment effort and resulted in the careful development and use of three separate instruments. These instruments sought to provide information on the reading skills and attitudes of students as high school seniors, since these would be the primary areas in which to seek effects. However, they also sought to provide information on a host of other characteristics within a model of reading development involving both the home and school (see Siegel, 1990). Put very simply, reading was viewed as a skill that is learned across development (i.e., from birth through adulthood). Across this period of

development, there are many indicators of how skill development is progressing. These indicators include test scores, academic grades in school, remedial reading needs, and general educational achievement indicators in both elementary and high school. If the kindergarten reading experience had an impact on students at or near the age of six, then it might be reflected in the students' reading skills and attitudes, not only as high school seniors, but also in other indicators of reading progress experienced across development. That is, the effects of early reading should show a clear pattern of impact on factors all along the way, not only at the end of formal schooling. Accordingly, the study sought to provide a coherent set of effects variables to be evaluated as part of the overall analytic strategy.

In summary, for the KRF Study, every effort was made to obtain information that would facilitate and compliment the analytical and measurement strategies developed in the original BRP inquiries. Critical to this study design was the availability of the original data that could be linked to follow-up data collected

from a large number of participants from different districts and schools, social class and ethnic backgrounds, and categories of kindergarten BRP implementation (i.e., number of BRP units completed). This would create the follow-up study database. These data would be used to define comparison categories reflecting different kinds of kindergarten reading experiences. Within these categories various effects variables, in logically related clusters, would be examined and used to cross validate the results of any single variable and comparison. Further, these results could then be examined again in other logically related frameworks. In this way, the strategy sought to produce a more powerful, coherent picture of the result than those derived from a single study. In essence, it can be viewed as a single study that is replicated and cross validated many times and ways.

Method

Conducting the KRF Study required the completion of three related groups of tasks. One set of tasks was the design, development, pilot testing, and final

preparation of the data collection instruments. This set of tasks resulted in the development of three instruments: *The Reading Biographer, Reading Vocabulary Test*, and the comprehension items from the *Academic Instructional Measurement Systems*. All three instruments were incorporated into a single 16-page data collection pamphlet called the *Student Booklet*. A second set of tasks was securing the participants and gathering the follow-up data. This involved identifying the BRP follow-up schools and districts, orchestrating the various activities required to obtain and maintain their participation, and doing the actual data collection, coding, and entry process. A third and final set of tasks was the formulation of the study design, analysis of the data, and documentation of the results. In the following sections, the procedures followed to complete each task are summarized. A more complete account of each task is given in Hanson and Siegel (1988a).

Instrumentation

The three data collection instruments were designed to accomplish two objectives. The first was to carefully assess the students' reading ability as high school seniors. This was accomplished through the use of two instruments:

1. A standardized test of reading comprehension, the *Academic Instructional Measurement System (AIMS)* developed by Sabers (1958) and used with permission of the Charles Merrill Publishing Company.
2. A specially developed test of reading vocabulary (Broach, Hanson, Siegel, 1988).

The *Reading Vocabulary Test* accurately estimated reading skill level based on knowledge of a carefully selected and calibrated set of reading vocabulary items (See Broach, Hanson, and Siegel, 1988). When used in combination with the AIMS reading comprehension test results, students could be placed in one of five reading categories corresponding to Chall's reading stages (Chall, 1983).

A second objective for the study instrumentation was to assess other factors in students' experiences related to their reading competence as high school seniors. Over the course of one full year a self-report questionnaire, referred to as *The Reading Biographer*, was developed for this purpose (Hanson and Siegel, 1988). *The Reading Biographer* measures the major events in a child's life, from preschool through high school, that are related to the development of reading competence in the areas of home, school, and extracurricular activities (Siegel, 1987; 1990). It utilized prior research, analytic methods, professional reviews, and a series of three empirical pilot studies to refine and produce the final form of this instrument. It provides information useful in formulating many independent and dependent variables, including (but not limited to) all those reported in this paper. The dependent (i.e., effects) variables include those pertaining to current reading attitudes and behaviors, amount of remedial instruction received, and academic grades and tracking status. Some independent variables included are socioeconomic (SES)

background information, preschool experiences, schools attended, and gender/ethnic group membership.

All the items contained in *The Reading Biographer* were developed following carefully defined measurement procedures. These included:

1. the development of individual items and questions that operationally defined responses designed to provide maximum discrimination between the behavioral categories of interest;
2. use of multiple items in the formulation of each variable to enhance validity and internal consistency reliability;
3. evaluation of all items with high school seniors in actual school settings in a series of three pilot studies;
4. validity and reliability checks from the pilot studies on each variable.

Participants

A large and representative sample of 3,959 participants provided data from high school seniors across the country who had entered specific elementary

schools in 1973-74. They were obtained from a total of 23 BRP school districts and one non-BRP district in 10 different states representing all regions of the country. The vast majority of the elementary schools represented had been designated as Title 1 eligible and served disadvantaged populations in 1973-74. Only 252 students, or 16 percent of the total BRP sample, were from non Title I schools. In the original kindergarten BRP inquiries, the overall sample of participating schools included a slightly larger sample of Title I schools (54%) and pupils (53%) than would normally be found in the general population (see Hanson and Schutz, 1975; 1976). In this study, an even larger percentage of both schools and students were Title I eligible. However, obtaining a large number of Title I students was considered desirable since a major objective of the BRP Follow-up Study was to assess the effects of the kindergarten reading effort at-risk student populations.

Comparison Groups

In addition to data from these high school seniors, the study contained the careful documentation of each elementary school's effort and degree of success in teaching kindergarten children to read using the BRP during the 1973-74 school year (Hanson and Schutz, 1976). This baseline information could be used to categorize those students who attended kindergarten in the elementary schools which implemented the BRP into various comparison groups. However, the full follow-up study sample included many high school seniors who were not in this category. Specifically, they were those who: (1) attended BRP elementary schools but not in kindergarten (i.e., entered in first grade or later); or (2) attended some other elementary school (usually in the same district) that did not implement the BRP in kindergarten. Collectively, these differences in the students' kindergarten and elementary experiences allowed for the formation of different comparison groups that facilitated the study objectives.

Specifically, the information was used to create two designs. In Design 1 there were three comparison groups defined as follows: (1) those who did not attend one of the BRP schools (i.e., assumed not to have received formal reading instruction in kindergarten); (2) those who began attending a BRP school in some grade above kindergarten (i.e., assumed to have the same or similar elementary school experiences as the kindergarten BRP students, but did not take part in the kindergarten BRP); and (3) those who began attending a BRP elementary school in kindergarten and therefore, received the BRP instruction. Note that only those students in category three received any kindergarten reading instruction Comparisons between students in categories 2 and 3 would be especially interesting; with the exception of the kindergarten BRP, these two groups shared the same or similar schooling experience and social class composition (see Design 1 in Figure 1).

Insert Figure 1 About Here

The data for these three comparison groups were evaluated in two ways. First, by simply comparing differences on potential effects variables among the three groups using a one-way analysis of variance (ANOVA) design; and secondly, by analyzing a two-way, main effects ANOVA design with the high school attendance center as one factor and the three categories as the second factor. In this way, variability in the effects variables due to differences among high schools (and also districts) could be evaluated independently of the kindergarten BRP experience variable.

Design 2 was also comprised of three comparison groups which more precisely examines the students in category 3 in Design 1. The three comparison groups in Design 2 are defined as follows (1) those who <u>did not receive</u> kindergarten reading instruction (i.e., categories 1 and 2 in Design 1); (2) those who <u>received some</u> kindergarten reading instruction (i.e., from 8 to 10 units.) These groups provide a more rigorous comparison since two of the groups received at least some kindergarten reading instruction. Here the

expectation would be that group 1 would provide the baseline measure, group 2 would show some effects, and group 3 would show the maximum difference on the effects variables. As with Design 1, the results were evaluated using both a one-way ANOVA and two-way ANOVA, with the high school attendance center being the second main effects factor.

One final note regarding the KRF Study designs. Because they use student-level data, other variables from the student questionnaire (i.e., *The Reading Biographer*) could be used to further examine the results for the effects variables. The specific variables used in this way were social class, gender and ethnic background. Presentation of the results using these status variables allows for closer examination of any differences found among the three comparison groups in each design. Also, they indicate if any findings that emerge for the overall population can be generalized across these subpopulations of interest. This strategy allowed for the more detailed examination of the bilingual population to be carried out as described in the next two studies.

Results

The students from the 24 school districts from 10 states which provided follow-up data are described in terms of their gender, ethnic/racial categories, and socioeconomic background in Table 1. As these data show, there were slightly more males than females and the sample was quite diverse in terms of ethnic and social class background. In terms of ethnic background, minority groups comprise about 40% of the total sample with Hispanic students accounting for about .03% of this total.

Insert Table 1 About Here

As might be anticipated, the social class background data show somewhat larger proportions in the lower and middle categories than the population at large. This was consistent with their representation in the original kindergarten BRP studies where lower SES groups and minorities were also overrepresented. Overall, these descriptive statistics show the diversity expected in a large sample of high school seniors with few unusual percentages.

Another important descriptive aspect of the follow-up sample is the extent to which students who received the kindergarten BRP reading instruction in 1972 are represented. Some data on this issue are given in Table 2. This summary gives the number of

Insert Table 2 About Here

students, high schools, and districts providing follow-up data by the three kindergarten/elementary school categories. As this table indicates, overall, a total of 3,959 students from 43 high schools in 24 districts participated in the follow-up study. The table also shows that each of the high schools and districts provided data on students who had quite different kindergarten and elementary school experiences. Thus, there were 1,549 (39%) seniors in the first category: those who did not receive the kindergarten BRP and did not attend an elementary school that offered it (i.e., they either attended another elementary school in the same district, or transferred into the district after elementary school). In the second category there were 867 (22%) high school seniors. The seniors in this

category did not receive the kindergarten BRP but did attend an elementary school that offered it (i.e., they enrolled in a BRP elementary school sometime after kindergarten). The third category contained 1,534 high school seniors (39%). The seniors in this category were the ones who both attended a BRP elementary school and received the kindergarten BRP instruction. The fourth and final category included nine seniors for whom no information was available on their elementary and kindergarten experience. The substantial number of high school seniors in the first three categories was considered a positive result; these three categories, as well as the subcategories within each, would provide the basis for forming the student groups used for comparison purposes in evaluating the effects variables.

Design 1 Comparison Results: Differences Between Kindergarten BRP Students and Students in Other Kindergarten Programs

The general analytical strategy was to evaluate each effects variable within each cluster within each of the two study designs composed of the three predefined comparison groups. Differences in effects were determined by using standard analysis of variance (ANOVA) procedures for each variable in a cluster. Then the patterns of significant differences that emerged for all variables were reviewed. The assumption was that if the subgroup results showed a clear and consistent pattern of effects, only then could the impact of early reading instruction be considered.

In Design 1, the comparisons were among three groups of students: (1) those who did not attend a BRP elementary school, (2) those who entered and attend a BRP elementary school after kindergarten (i.e., first grade or later) and, (3) those who participated in the kindergarten BRP and attended a BRP elementary school. Of special concern was to see if the overall levels of

attainment of the students who received the kindergarten BRP were comparable to those students who (1) had clearly different kindergarten experiences but otherwise comparable schooling histories (i.e., group 2, attended the same elementary school but not in kindergarten) and, (2) differed in both their kindergarten and other elementary school experiences (i.e., group 1, attended other elementary schools).

Differences among the three comparison groups on 12 effects variables were evaluated using simple ANOVA procedures. A summary of these analyses is presented in Table 3. These results show that significant mean

Insert Table 3 About Here

differences on all four reading competency variables were found among the three comparison groups. Further, when one looks at the means for each of the three groups, a consistent source for these differences emerges; it is between the children who received kindergarten reading (category 3) as compared to the children who received none. That is, the students who received the BRP instruction in kindergarten attained

clearly higher scores on all four measures of reading competency than either those who entered the BRP school after kindergarten or attended another elementary school that did not offer the kindergarten BRP. Moreover, the mean scores of the students who received no kindergarten reading instruction were nearly identical. This supports the contention that the differences observed were due to the kindergarten reading experience rather than to some other factor associated with their subsequent schooling.

Significant differences were also found among the students in the three comparison groups in terms of the social class status of their families and parents' education. However in both cases, it is in a direction opposite from that suggested by the other reading competence differences. Students who received the kindergarten reading instruction came from families with a lower social class background than those who did not. This is an astounding result but consistent with the fact that most districts that chose to implement the BRP in the 1970's chose to implement it in their poorest schools. In essence then, not only did the

students who received formal reading instruction in kindergarten show a clear pattern of (a) superior current reading skills, (b) higher grades and better attendance in school, and (c) needing and receiving significantly less remedial instruction in both elementary and secondary school but, they were also from families with a significantly lower social class status and parent education as compared to those in the other two comparison categories.

This type of finding was considered extraordinary and additional analyses were carried out to examine these data at a more detailed level (Hanson & Siegel, 1988a). The more detailed analyses directly support the earlier proposition that early reading impacts the effects variables as expected. Moreover, the differences observed in the key effects variables emerge even when controlling for differences between high schools and districts.

Design 2 Comparison Results: Differences Among Student Groups Receiving None, Some, and Much/All Kindergarten BRP.

Design 2 focuses on those students who received different amounts of kindergarten BRP instruction. This focus pursued the finding from the original BRP inquiries which showed that the more kindergarten BRP units completed in each classroom, the higher the students' reading skills were at the end of kindergarten. Accordingly, the first category includes all students who did not receive any kindergarten BRP instruction, regardless of where they attended elementary school. In the second category are all students who attended elementary schools implementing part of the BRP (i.e., between 1 and 7 units) and the third category includes those completing most or all of the Program (i.e., between 8 and 10 units). In this design, category 1 (None) can be viewed as a large, diverse baseline category composed of over 2,400 students who, it was assumed, did not receive any kind of formal reading instruction in kindergarten. The second and third categories were those who received

either some or all of the kindergarten BRP instruction. The expectation was students in the second and third categories (which included all the kindergarten BRP students) would differ from those in category 1, which serve in this design as a baseline comparison group.

Collectively, these Design 2 results extended the earlier results provided in Design 1. They show that, not only are there effects associated with students receiving formal reading instruction in kindergarten, but also with the student groups defined by the amount of kindergarten reading instruction. Hence, not only is kindergarten reading important, but the more reading instruction, the better. Put another way, the effects variables, measured twelve years after the students' kindergarten BRP experience, showed reliable differences corresponding to differences in the amount of reading instruction the students received in kindergarten.

Kindergarten Reading and Adult Literacy

One final set of analyses using the Design 1 and 2 categories were carried out to further examine the

differences obtained among student within the three biosocial classifications (i.e., racial/ethnic, gender, and social class groups). One-way ANOVA's were computed for each group and design on each dependent variable and the means were plotted. Close examination of these data revealed that there was a remarkable degree of correspondence between the results obtained within each of the categories formed by the biosocial variables (i.e., ethnic background, gender, and SES) and those shown for the full sample. Within nearly every category of these biosocial factors, the means for the students who received the kindergarten BRP were clearly higher.

Because of the space limitations, all of these analyses are not reproduced for this report (See Hanson and Siegel, 1988). However, one set of analyses using a broad measure of illiteracy is given. The "Illiteracy" variable was derived from Chall's reading stage. The Chall "Reading Stage" variable placed each student into one of five categories by utilizing the combination of their reading vocabulary and performance on two types of reading comprehension items (literal

and inferential). To create the "Illiteracy" variable used here, those students in the two lowest categories, corresponding to functioning at or below a standardized fifth grade reading level (i.e., functionally illiterate for a high school senior), received a one (1). Thus, "Illiteracy" simply indicates whether or not a student is in either of these two categories. When it is summarized for a student group (and multiplied by 100), the mean gives the percent of students in each group of these low categories; that is, the percent of students who are clearly classified as functionally illiterate as high school seniors.

The results of the analysis for this variable are presented in Table 4 and show the practical impact of kindergarten reading instruction on this one global measure of adult literacy. The entries in this table indicate the percentage of students in each comparison category who were reading at or below the 5th grade levels as seniors in high school; these data are given by ethnic/race, gender and social class populations.

Insert Table 4 About Here

Perhaps more directly than any other analysis, these data show the practical effects associated with beginning formal reading instruction in kindergarten. The students who learned to read in kindergarten fared better in all groups than those who did not. In virtually every category the data show the same consistent pattern of results; the percentage of functionally illiterate students is lower for groups who participated in the kindergarten reading program. Depending on the specific group, these differences varied from 2% to as much as 16%. Note, however, that the results for each group always favor the kindergarten readers. As Table 4 indicates, in the full sample, there were about 8% fewer of these poor readers among students who had the kindergarten reading program as compared to those who did not. Put another way, there were about one-third fewer functionally illiterate high school seniors among those who received reading instruction in kindergarten as compared to those who did not.

Couple these results with the fact that the schools which taught reading in kindergarten included

more students from disadvantaged backgrounds (lower SES) and these results are even more astounding. For these students to be even comparable to higher SES groups, who did not receive kindergarten reading instruction, would be a significant accomplishment. The fact that they read better overall and that there were substantially fewer students in the functional illiterate category is extraordinary.

A conservative estimate of this effect for each group can be obtained by comparing each group's percentage of low-level readers to the average for that row (last column). These data are summarized in Figure 2 and show that these differences vary from 1 to 9

Insert Figure 2 About Here

percent, depending on the specific group. The largest percentages are in the groups that are typically from disadvantaged backgrounds and who usually have high illiteracy rates as adults. These include those students in the ethnic minorities, males, and those from lower social class backgrounds. Hispanic students, for example, showed differences of 5%;

meaning that those Hispanic students who received the kindergarten BRP had 5% fewer students in the functional illiterate category than those who did not.

However, the data also show that the effects extend beyond these groups to students in virtually all categories. In terms of the proportion of poor readers within any given category, the kindergarten reading experience was at least valuable for the advantaged as for the disadvantaged populations. Together, these results clearly show that the kindergarten reading experience was advantageous in reducing the number of poor readers in all groups. The at-risk groups showed the greatest percentage differences, but they also had the largest percentages of students in the lowest reading category.

Conclusions

The analyses within both designs showed clear and consistent support for teaching reading kindergarten. Participation in a systematically developed and carefully implemented kindergarten reading program was related, not only to higher reading skills, but to

higher performance on all indicators of reading competency. Further, students from schools completing more of the Program were better readers as high school seniors when compared to those from schools completing only a portion of the program. In comparing the kindergarten reading students to other students in their same district who did not receive any kindergarten reading instruction, the results were even more conclusive. Learning to read in kindergarten was not only related to higher reading skills but it reduced the need for remediation at both elementary and high school levels. Students receiving the kindergarten reading instruction fared better in all ways than those who did not receive the instruction; these results were consistent across districts and by racial/ethnic, gender, and socioeconomic groups.

Part II: The Non-English Language Background Kindergarten Follow-up (NKF) Study

The methodology used in the KRF Study allowed for a closer examination of the three kindergarten reading comparison groups to see if the findings could be generalized to specific subpopulations of interest.

One such population is NELB students. Hence, these students were the focus of the first NELB study, the NKF Study. The NKF Study examined the policy issue of whether or not it was advantageous for schools to provide formal reading instruction in English to bilingual children in kindergarten.

Background

The debate taking place in both the research and policy arenas concerning the timing and methods used to present formal reading skills to children from bilingual families is even more complex than that for monolingual students (e.g., Garcia, 1987). Here the debate centers around, not only the age at which formal reading instruction should begin, but also whether it should be in a bilingual or "English only" format.

One of the difficulties in researching both of these issues is that most research cannot afford the luxury of taking a longitudinal/developmental approach. As as result, most studies are of short duration and critics can dismiss any successful efforts by saying the effects obtained are probably temporary and will

dissipate, or perhaps even turn negative, over time. In essence, it is difficult to find studies with data that (a) can operationally define both the type and timing of students' initial formal reading instruction and, (b) have follow-up data documenting the achievement of students involved in such programs at a later point in time (e.g., at the end of their formal schooling). Since the KRF Study database fulfilled both of these criteria, analyses could be carried out that would provide some insights into this debate.

Method

In the NKF study, three of the dependent variables from the KRF study were evaluated for those students who were self-defined as speaking English as a second language (ESL); that is, those students who reported that a language other than English was the dominant language spoken in the home by both the parents and the children. Figure 3 describes the three dependent variables. For each of these variables an analysis of variance (ANOVA) was computed to compare results for students in the three kindergarten reading experience

categories: (1) No kindergarten reading instruction, (2) some kindergarten reading instruction, and (3) much/all kindergarten reading instruction. The results appear in the following section.

Insert Figure 3 About Here

Results

There were 496 students, or 12.5% of the full study sample (N = 3,959) designated as bilingual (i.e., from homes in which both parents and children regularly spoke a language other than English). About one-half of these students spoke a European language other than Spanish; about 1/3 spoke Spanish, and the remainder were in the "Asian" and "Other language" categories.

Insert Table 5 About Here

Table 5 reports the results of the three bilingual kindergarten reading comparison groups. Overall, the results show that kindergarten reading instruction was a significant factor for two of the three dependent variables: "Remedial Experiences" and "Reading Comprehension." Looking at the three comparison groups

for "Remedial Experiences", we see that the students who received the full kindergarten reading instruction had 14% fewer students in remedial classes as compared to those who had none and 4% fewer than those who had received only part of the instruction. This has important economic, as well as educational, implications for school districts, since providing remediation is not only costly, but largely ineffective and highly related to drop-out rates. Thus, school districts can estimate the dollar amount saved in remediation costs alone by reducing remediation by 14%.

Turning to the "Reading Comprehension" variable, once again, the unlikely result observed in the KRF Study emerges again. That is, the bilingual students from the Title I schools (i.e., "disadvantaged") scored significantly higher than those from the non-Title I schools (i.e., "advantaged"). Also, as with the other two variables, we see that the mean score is higher for those students who received most or all of the reading instruction in kindergarten than for those who received only part of the instruction. These findings suggest that immersing bilingual students in an English

speaking program of beginning reading instruction at an early age is both appropriate and effective. Furthermore, the more of this kind of instruction (within the parameters described here), the better readers they will be as adults.

Although the third variable, "Vocabulary" was not statistically significant in the ANOVA, the mean scores clearly follow the same consistent pattern of increase associated with each of the three levels of kindergarten reading implementation. That is, the mean score was highest for those students who received all of the instruction and lowest for those students who did not receive any kindergarten reading instruction.

Conclusions

Analyzing these data and examining the separate means for all of these variables (within each cell of the ANOVA), the following conclusions seem warranted. The bilingual students who received the kindergarten reading instruction showed clear patterns of higher vocabulary and reading comprehension scores and required less remediation as seniors in high school

than those who did not receive the early reading instruction. This is an exceptional finding and particularly important since those students receiving the early reading instruction were from a lower social class background than those not receiving it. Consistent with a poorer SES background, children from those homes would also be expected to have less language background and experience in any language (i.e., either their native language or English).

Also significant, however, is the finding that the mean scores for all three effects variables were higher for the students who received most or all of the kindergarten reading instruction than for those who only received a portion of the program. Being able to relate such subtle implementation differences to an educational intervention over a short-term period would be unusual; being able to discern such effects over a period of twelve years can only be called astounding.

In summary, the results of the analyses presented in this study provide support for the conclusion that the positive effects of beginning formal reading instruction in kindergarten generalize to NELB

children. This is, consistent with the findings for other population groups, those NELB students who began receiving their formal reading instruction in English at the kindergarten level had fewer remedial experiences and better vocabulary and reading comprehension scores as seniors in high school than those bilingual students who did not.

Part III: The NELB Student Achievement (NSA) Study

The findings of the NSF Study supported providing reading instruction in English to kindergarten students from bilingual families. Further, a more detailed analyses of the high school achievement variables showed that the NELB students actually showed better results, as a group, than the monolingual students in several areas (Hanson, Molina, and Siegel, 1988). Hence, a second NELB study, the NELB Student Achievement (NSA) Study, sought to further examine this general issue of non-English language background and student achievement. That is, is being bilingual an

advantage or disadvantage to overall school achievement?

Background

There is little agreement about the effects of bilingual background on the schooling achievement of children (Hakuta and Pease-Alvarez, 1992; Lewelling, 1991). In fact, much of the early research contended that bilingualism could have a harmful effect on children's intellectual development (e.g., Yoshioka, 1929; Smith, 1931, 1939; Anastasi and Cordova, 1953). More recent studies, however, have suggested that bilingualism may actually be beneficial to cognitive ability (Peal and Lambert, 1962; Ben-Zeev, 1977; Duncan and DeAvila, 1979; Goldsmat, 1982; Cummins, 1982). Still, many educators, parents, and policy makers argue that bilingualism hinders the mastery of English and, therefore, the ability to do well in school and, eventually, the work place (e.g., Youth Policy, 1983; Crawford, 1989).

Purpose

The NSA Study sought to provide further insights into this debate. Using the KRF Study database, this study examined the schooling achievement of children from bilingual homes and compared them to similar samples of children from monolingual homes. The purpose was to determine if children who have had the experience of growing up bilingual would display achievement levels that were below, the same, or higher than their monolingual peers from the same social class background.

Method

For this study, the students were divided into two major groups based on their linguistic background: (1) bilingual (i.e., a language other than English was the dominant language spoken in the home by both the parents and the children) and (2) monolingual (i.e., English was the only language spoken in the home). Measures obtained on each of nine dependent variables (seven achievement and two background) for bilingual students within each of three social class categories

(low, middle, and high) were compared with the scores obtained by the monolingual students within each of these same social class categories. These nine variables and their descriptions are provided in Figure 4.

Insert Figure 4 About Here

The study used seven variables measuring achievement; three of these variables were measures of either reading achievement or vocabulary. The "Reading Comprehension" variable consisted of scores obtained on the Aims Instruction Measurement System (AIMS). "Reading Vocabulary" was a measure of the students' vocabulary and was obtained from a theory-driven vocabulary test specifically developed to provide stable, interpretable estimates of respondent vocabulary size (Hanson and Siegel, 1988; Borach, Hanson, and Siegel, 1988). Both of these tests conformed to the requirements for the formulation of another reading achievement variable, "Reading Stage". This variable categorized students' reading skills into

one of five different categories, based on the Chall model of reading stages (Chall, 1983).

Four other achievement variables were measures of general school achievement. "Elementary Remediation" and "Secondary Remediation", measured the number of years the students participated remedial classes and/or were held back in elementary and high school. "Elementary Achievement" and "Secondary Achievement" measured student achievement in terms of the student's usual grade in reading or English and number of days missed each year in school.

The last two variables included in this study, "Kindergarten Reading: and "Family Size", were background variables which previous studies had indicated contribute to students' overall school achievement. The "Kindergarten Reading" variable measured whether or not the students participated in a beginning reading program in kindergarten. Since this variable was a significant factor in the reading achievement of bilingual students, as well as the overall sample, it was considered to be an important variable to consider in this study. "Family Size"

measured the number of people in the student's immediate family. Overall, children from larger families tend to do less well in school than those from smaller ones; thus, this was considered another important variable to examine.

Results

Each of the nine dependent variables (See Figure 1) were evaluated for the two language experience groups via descriptive statistics and a two-way ANOVA procedure. Then the separate means for each of the nine variables (within each cell of the ANOVA) were reviewed. Together they showed consistent results regarding the long-term achievement levels of bilingual students, as compared to monolingual students. The complete two-way ANOVA results for one of the dependent variables, "Reading Comprehension", is presented in Table 6. A summary of the results for all nine dependent variables, including the cell means, are given in Table 7.

Insert Tables 6 and 7 About Here

The results in Table 6 show that, as far as overall reading comprehension at the 12th grade level is concerned, there was no statistical difference between the two groups. That is, the fact that the students were bilingual did not appear either to contribute to, nor detract from, their overall level of reading achievement as measured on a norm-referenced reading ability test. This was somewhat surprising since this is an English language test. The fact that these bilingual students did not score lower on an English test of general reading comprehension is comparable to English speaking students taking a test in a second language and scoring about the same as students who speak that language fluently.

In fact, as Table 7 indicates, only three variables showed any differences between the bilingual and monolingual populations: "Reading Vocabulary", "Kindergarten Reading", and "Family Size." All of these would logically be expected to show a difference in mean scores. Vocabulary, which is a component of reading ability, is largely impacted by the home and family environment (Anderson, et al., 1985). Thus,

students who are only exposed to English at school and through extra-curricular activities would be expected to have less of an English vocabulary than those students from homes where only English is spoken.

Table 7 also indicates that more of the bilingual students participated in a kindergarten beginning reading program. Since this was a Title III program and implemented largely in schools with disadvantaged populations, this is also to be expected. This probably means that the number of bilingual students who participated in a kindergarten beginning reading program was larger from poorer families than the monolingual students who participated in the same program. It is important to recall, however, that the earlier studies showed that participating in this program was related to students' overall level of school achievement. Therefore, it is possible that this one factor may have had an impact on the mean scores of the achievement variables in this study.

Finally, the vast majority of the bilingual students in the study come from Hispanic and lower social class populations. Since these populations tend

to have more children than the comparison population, the mean for the bilingual population would be expected to be higher for this variable.

More unexpected is the fact that all of the other six variables, which measure school achievement, show no difference between the two groups. Furthermore, by examining and comparing the mean scores on these variables within social class categories (e.g., low monolingual with low bilingual), one can see that the scores on the bilingual students in the high social class categories show a slight advantage over the monolingual students in the same category. Although this difference is not enough to be statistically significant, it does mean that, on average, the bilingual students from more advantaged homes had less remedial experiences and higher levels of achievement, both in elementary and in high school. However, as might be expected, the two reading achievement scores, "Reading Comprehension" and "Reading Stage", were slightly higher for the monolingual students.

Conclusions

The results of the analyses presented in this study provide useful information concerning the progress, over time, of NELB students in our schools. They indicate that these students are generally not at a disadvantage in terms of standard educational measures taken in high school. That is, after controlling for social class and family size, bilingualism has little effects on the general achievement levels of children.

One variable shown to contribute to the overall achievement levels of both bilingual and monolingual students in earlier studies was participating in a beginning reading program in kindergarten. This study showed that significantly more bilingual students participated in this program than monolingual students. Thus, as noted earlier, this variable may have effected the mean scores on the other variables. Therefore, it is recommended that this variable be examined further. This would involve carrying out an analysis of covariance to determine, if indeed, participating in a

kindergarten reading program would impact the other achievement variables.

The NKF Study found that the positive effects of early reading instruction generalize to bilingual children. The NSA study showed that, when the effects of students' social class background are taken into account, being bilingual has little or no relationship to higher overall levels of school achievement. Furthermore, if any relationship does exist, it is more than likely a positive one.

Conclusions and Policy Implications

The analyses within both study designs showed clear and consistent support for teaching reading in English to NELB students in kindergarten. Participation in a systematically developed and carefully implemented kindergarten reading program was related, not only to higher reading skills, but to higher performance on all indicators of reading competency. Further, students from schools completing more of the Program were better readers as high school

seniors as compared to those completing only a portion of the Program. In comparing the kindergarten reading students to other students in their same district who did not receive any kindergarten reading instruction, the results were even more conclusive. Learning to read in kindergarten was not only related to higher reading skills, but it reduced the need for remediation at both the elementary and high school levels. Students receiving the kindergarten reading instruction fared better in all ways than those who did not receive the instruction. Moreover, these results were consistent across districts, and by racial/ethnic, gender, socioeconomic, and bilingual groups. In all comparisons, the kindergarten reading students clearly emerged as better off than those who did not receive the instruction.

The results of these two studies also challenged the popular notion that students who are bilingual are necessarily at a disadvantage in school. To the contrary, they indicated that bilingual students, particularly those who are provided with early reading instruction in English, are generally <u>not</u> at a

disadvantage in terms of standard educational measures taken in high school. That is, after controlling for social class and family size, bilingualism has little effects on the general achievement levels of children.

These studies, though simplistic when compared with the full set of possibilities that such a methodology would present, could also be used to define schooling effects more precisely than before. One example would be to show how schooling effects can be translated directly into cost information by comparing groups in terms of the amount of remedial education required by students across all three categories. Coupled with information on the costs of remedial efforts, the effects of kindergarten instruction can be translated into a direct cost-benefit figure (e.g.. Hanson and Siegel, 1989). Likewise, such figures can be generated using the illiteracy information. How much does it save society when the proportion of illiterate high school seniors are reduced by one-third?

Although schools are generally not able to provide data on the programs and experiences of students who

progress through them, such a capability is emerging rapidly in some districts. Schools and other social service institutions are improving in their ability to handle information. Accordingly, better and more complete resources for policy information on schooling should emerge in the near future. Such information can then be used to routinely monitor the long-term effects of given practices and programs such as kindergarten reading, both within and across districts (Hanson and Siegel, 1991).

Additional research needs to be carried out using new data sources and evaluation methods. One promising approach is through the ongoing compilation and analysis of data within schools, rather than single one-shot studies such as that carried out here. Programs, people, processes, and their interrelations are dynamic, not static, entities. Hence, policy researchers, school administrators, and other consumers and producers of educational policy need to constantly monitor them. The perspective, in particular its utility for understanding the costs and effects of

school programs, has been developed elsewhere (Hanson, 1986).

The extraordinary findings of superior reading competency being associated with receiving reading instruction in English in kindergarten, examined across districts and schools, as well as ethnic, gender, socioeconomic, and bilingual groups, provides the strongest possible support for early reading programs. Given that the results were obtained from a variety of analyses, the findings suggests that there is absolutely no evidence of any negative effects from learning to read in kindergarten and, thus, any district which does not currently have a policy of teaching reading in kindergarten should be ready to present new and compelling reasons to support that policy -- beyond the old studies and notions that it has long-term, adverse effects on students' reading skills, attitudes, and behaviors. The question that now faces school policy makers is, "Why are we not providing formal reading instruction to all children at the kindergarten level?"

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TABLES & FIGURES

Table 1. Description of KRP Study participants by gender, ethnic/racial background, and socioeconomic categories.

Factor	Categories		Number	Percentages
Gender	1	Females	1888	48.0
	2	Males	2049	52.0
Ethnic Background	1	Asian	303	8.3
	2	Black	687	18.8
	3	Hispanic	110	3.0
	4	Native American	375	10.0
	5	All Others	2177	59.6
Social Class	1	Lowest	428	11.0
	2	Lower Middle	1070	27.5
	3	Middle	1430	36.8
	4	Upper Middle	711	18.3
	5	Highest	245	6.3

Table 2. The number of students, high schools, and districts included in the full KRF Study sample.

Kindergarten/Elementary School Categories	Students No.	Students Percent	High Schools	Districts
1. No BRP or BRP Elementary School	1,549	39	41	23
2. No BRP, some BRP Elementary School	867	22	42	23
3. BRP and BRP Elementary School	1,534	39	41	23
4. No Information	9	--	--	--
Totals	3,959	100	43	24

Table 3: Summary of the ANOVA results and the effects variable means for Design 1 categories based on the elementary school attended and kindergarten BRP instruction.

Effects Variables	Kindergarten BRP Experience Categories: No BRP/ No BRP School (n = 1516) (1)	No BRP/ BRP School (n = 846) (2)	BRP/ BRP School (n = 1409) (3)	ANOVA Sig. Level
Current Reading Competency				
Comprehension	12.6	12.7	13.2	.00
Vocabulary	17.0	16.9	17.4	.00
Overall Reading	2.7	2.7	2.8	.00
Illiteracy	.17	.18	.11	.00
Reading Attitude & Behavior				
Attitude	4.3	4.3	4.4	.34
Books Read this Year	2.4	2.4	2.4	.58
Time Spent Reading	1.5	1.6	1.6	.01
Schooling History				
Remediation	.55	.28	.23	.00
Grades and Attendance	5.2	5.2	5.4	.00
High School Track	2.3	2.2	2.3	.24
Family Background				
Socioeconomic Status	2.9	2.8	2.7	.00
Parents' Education	2.7	2.5	2.4	.00

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Table 4. Percent of students in each kindergarten and elementary experience comparison category who can be classified as functionally illiterate as seniors in high school (i.e., reading at or below the 5th grade level).

Biosocial Variables	No BRP/ No BRP School 1	No BRP/ BRP School 2	BRP/ BRP School 3	Overall Percentages
Ethnic Background				
Asian	13	10	01	9
Black	44	39	28	37
Hispanic	35	31	26	31
Native American	20	22	18	20
Others	8	8	6	7
Gender				
Female	15	17	11	14
Male	18	18	11	15
Socioeconomic Status				
Low	21	25	14	19
Medium	18	16	11	15
High	7	10	5	7
Overall	17	18	11	15

Table 5. ANOVA results for the three dependent variables by kindergarten beginning reading program (BRP) categories.

	Dependent Variables		
Kindergarten BRP Categories	Remedial Experiences	Vocabulary	Reading Comprehension
No Kindergarten BRP	.32 (n=286)	16.1 (n=292)	11.6 (n=290)
Some Kindergarten BRP (1-7 units)	.22 (n=36)	16.2 (n=36)	13.0 (n=36)
Most/All Kindergarten BRP (1-10 units)	.18 (n=164)	17.0 (n=168)	13.2 (n=167)
p level	.01	.08	.00

Table 6: Two-way ANOVA breakdown for one dependent variable: Reading Comprehension

Source of Variation	DF	Sum of Sq.	Mean Sq.	f	Sig. f
Main Effects	3	629.8	202.9	14.1	.000
Social Class	2	580.4	290.2	19.5	.000
Language	1	44.3	44.3	3.3	.084
2-way Interaction					
Social Class and Language	2	18.4	9.2	.62	.538
Explained	5	648.2	129.6	8.7	.000
Residual	3018	44867.1	14.6		
Residual	3023	45515.3	15.1		

Table 7: Summary of two-way ANOVA results (Bilingual/Monolingual and three Social Class categories) for the nine dependent variables.

	Bilingual Students			Monolingual Students			
Dependent Variables	Low SES (n=149)	Mid SES (n=92)	Hi SES (n=14)	Low SES (n=1580)	Mid SES (n=999)	Hi SES (n=190)	Sig. f
Reading Comprehension	12.1	12.8	13.1	13.0	13.1	14.9	.084
Reading Vocabulary	15.2	16.1	18.0	17.1	17.1	20.9	.000*
Reading Stage	2.6	2.7	3.0	2.8	2.8	3.4	.634
Elementary Remediation	.33	.33	.07	.30	.33	.19	.821
Secondary Remediation	.25	.28	.07	.25	.33	.19	.903
Elementary Achievement	2.8	2.7	3.1	2.7	2.7	3.0	.606
Secondary Achievement	2.4	2.4	3.3	2.4	2.4	2.9	.995
Kindergarten Reading	1.47	1.52	1.38	1.38	1.40	1.35	.002*
Family Size	4.3	4.4	4.0	4.0	3.8	3.7	.000*

DESIGN 1 COMPARISON CATEGORIES

Kindergarten Experience Categories

No kindergarten BRP/ No BRP elementary school	No kindergarten BRP/ Attended a BRP elementary school	Kindergarten BRP/ Attended a BRP elementary school
n = 1161	**n = 871**	**n = 1453**

Note: Student is the unit of analysis and all students are included. High school is used as a control factor in the two-way ANOVA.

DESIGN 2 COMPARISON CATEGORIES

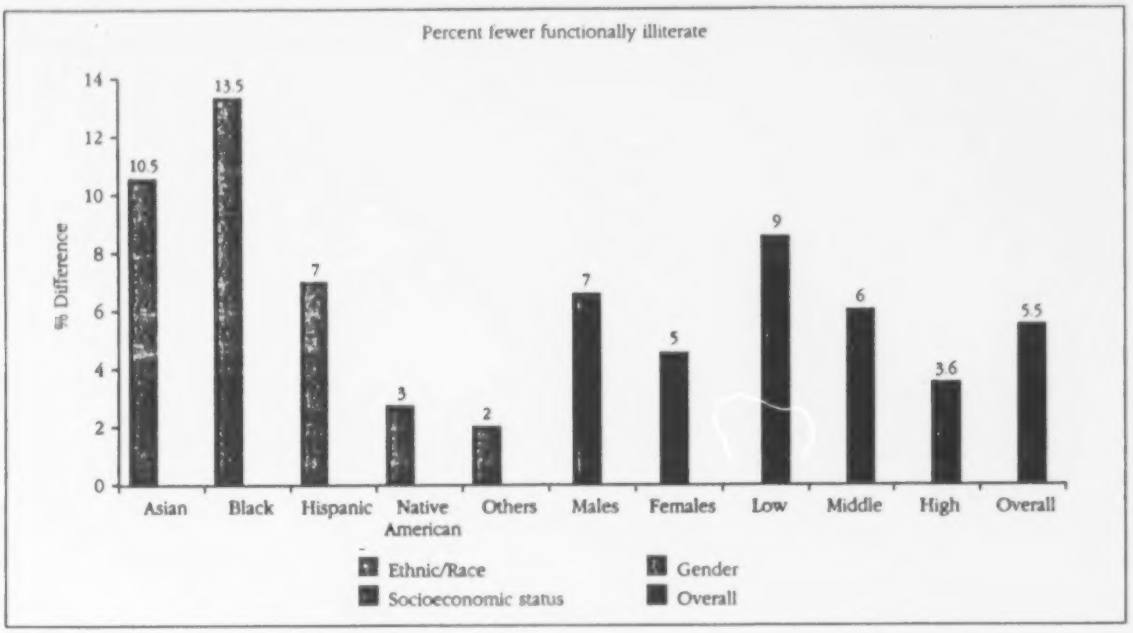
Kindergarten Experience Categories

No Kindergarten BRP	Some Kindergarten BRP	Most/All Kindergarten BRP
n=2425	n=443	n=1091

Note: Student is the unit of analysis and all students are included. High School is used as a control factor in the two-way ANOVA.

Figure 1. Number of students and a description of each BRP Follow-up Study design comparison groups.

Figure 2. Illustration of the mean differences in percent between the overall average and those students who participated in the kindergarten Beginning Reading Program by ethnic group (Asian, Black, Hispanic, Native American, and Other), social class, and gender.



1. AIMS Reading Comprehension Score (RDGSCR): A standardized test of reading comprehension skill (Sabers, D., 1985).

2. Vocabulary Score (VOCSCR): A test used to estimate the size of one's reading vocabulary (Broach, Hanson & Siegel, 1988).

3. Remediation (REMED): An index reflecting the amount of remedial reading experiences in elementary and high school (Note: a lower number indicates fewer remedial experiences).

Figure 3: Description of the three dependent variables

INDEPENDENT VARIABLES

Social Class	Social Economic Class 1 = Low 2 = Middle 3 = High
Language	Dominant Language Spoken by both Parents and Student in the home 1 = Foreign 2 = English

DEPENDENT VARIABLES

Reading Comprehension	Score obtained on the AIMS norm-referenced reading test Range = 1 - 20
Reading Vocabulary	Score obtained on a norm-referenced vocabulary test Range = 1 - 25

(figure continues)

Figure 4 Continued

Study Variables

INDEPENDENT VARIABLES	
Reading Stage	Chall Reading Stage Categories 1 = 3rd - 5th grade reading level 2 = 5th - 7th grade reading level 3 = 7th - 10th grade reading level 4 = 10th - 12th grade reading level
Elementary Remediation	Number of years attended remedial class and/or held back in grades 1 - 6 1 = No remediation 2 = 1 year in remedial classes and/or held back one year 3 = 2 years in remedial classes and/or held back 2 years 4 = 3 or more years in remedial classes or held back 3 years or more

(figure continues)

Figure 4 Continued

Study Variables

INDEPENDENT VARIABLES

Secondary Remediation	Number of years attended remedial class and/or held back in grades 7 - 12 1 = No remediation 2 = 1 year in remedial classes and/or held back one year 3 = 2 years in remedial classes and/or held back 2 years 4 = 3 or more years in remedial classes or held back 3 years or more
Elementary Achievement	Usual grade received in reading and usual yearly school attendance in grades 1 - 6 1 = Low Achievement 2 = Average Achievement 3 = Above Average Achievement 4 = Superior Achievement

(figure continues)

Figure 4 Continued

Study Variables

INDEPENDENT VARIABLES	
Secondary Achievement	Usual grade received in English and usual yearly school attendance in grades 7 - 12 1 = Low Achievement 2 = Average Achievement 3 = Above Average Achievement 4 = Superior Achievement
Kindergarten Reading	Participation in a beginning reading program in kindergarten 1 = Did not participarte in a beginning reading program in kindergarten 2 = Participated in a beginning reading program in kindergarten

(figure continues)

Figure 4 Continued

Study Variables

INDEPENDENT VARIABLES	
Family Size	Number of people in the immediate family
	1 = 2 people in family
	2 = 3 people in family
	3 = 4 people in family
	4 = 5 people in family
	5 = 6 people in family
	6 = 7 people in family
	8 = 8 or more people in family

Figure 4: Dependent and Independent Variables and Coding Descriptions.